THICKNESS VARIATION OF HARDWOOD LUMBER PRODUCED IN 1963 BY CIRCULAR SAWMILLS IN NORTH CAROLINA

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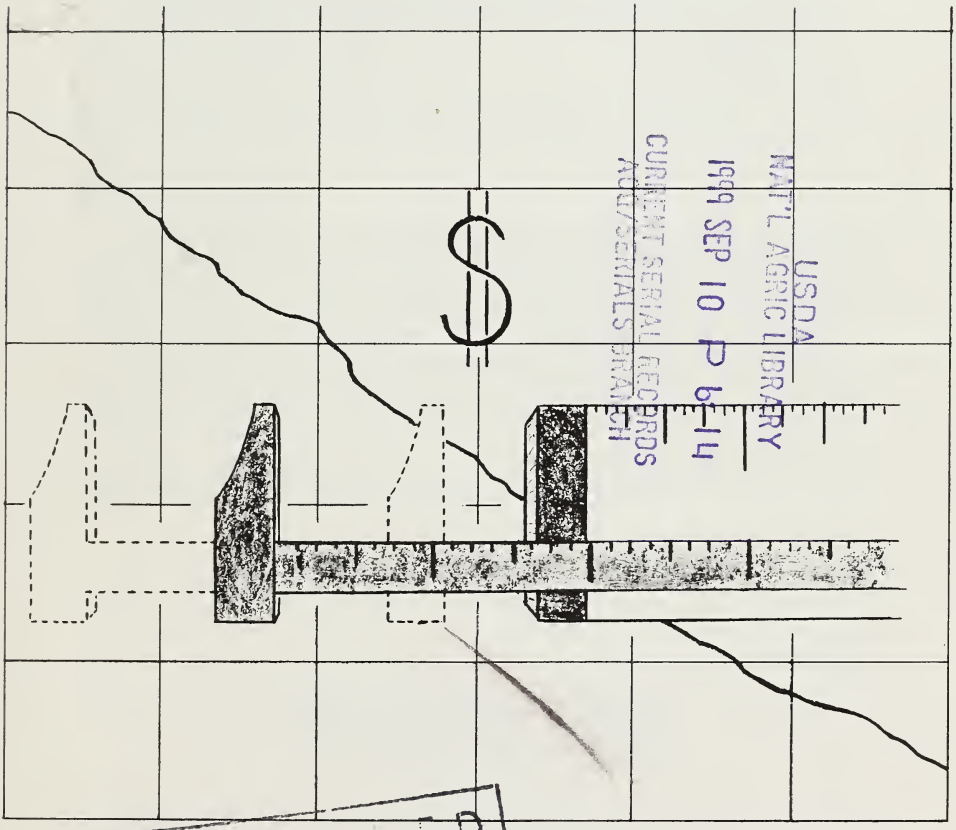

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This report is issued by the Hardwood Research Council in cooperation with the Duke Power Company and the U. S. Forest Service.

In the interest of conserving our national resources, the Council believes that a better job can and must be done in converting trees into lumber and subsequently into other products. Small circular sawmills can produce accurately sawn lumber. This report reveals that the amount of mismanufactured lumber has increased through the three study periods reported. The solution to this problem requires the coordinated efforts of lumber buyer and lumber manufacturer.

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Milton Applefield and Paul J. Bois[1]

Introduction

Uniformity in lumber dimension is essential to its efficient use. Non-uniformity of dimension is wasteful to the producers and users of hardwoods.

This report is the third study over a 10-year period to evaluate hardwood lumber thickness variation.[2] [3] It points out the need for maintaining lumber sizes within allowable limits.

Method of Study

A minimum of two truckloads of lumber were randomly selected at each of 16 furniture plants at 12 locations in North Carolina (fig. 1). From a total of 32 truckloads of lumber, comprising about 112,280 board feet, every tenth board was taken for sampling. In this manner, 4,940 board feet were sampled.

All boards sampled were native furniture hardwoods, circular sawn to either 4/4 or 5/4 inches in thickness. Of this sample volume 87½ percent was 4/4 lumber and 12½ percent was 5/4.

Each sample board was calipered for thickness to the closest sixteenth of an inch at 6 points, as illustrated:

[1] Wood Scientists, Southeastern Forest Experiment Station, Forest Service, USDA.

[2] Doyle, H. J., and Taras, M. A. Amount of mismanufactured lumber received at North Carolina furniture plants. Furniture, Plywood and Veneer Council of the North Carolina Forestry Association in cooperation with Southeastern Forest Experiment Station, Forest Service, USDA, Dec. 1955.

[3] Rodenbach, R. C., and Doyle, H. J. Thickness variation of lumber cut in 1959 by circular mills in North Carolina. Furniture, Plywood and Veneer Council of the North Carolina Forestry Association in cooperation with Southeastern Forest Experiment Station, Forest Service, USDA, July 1960.

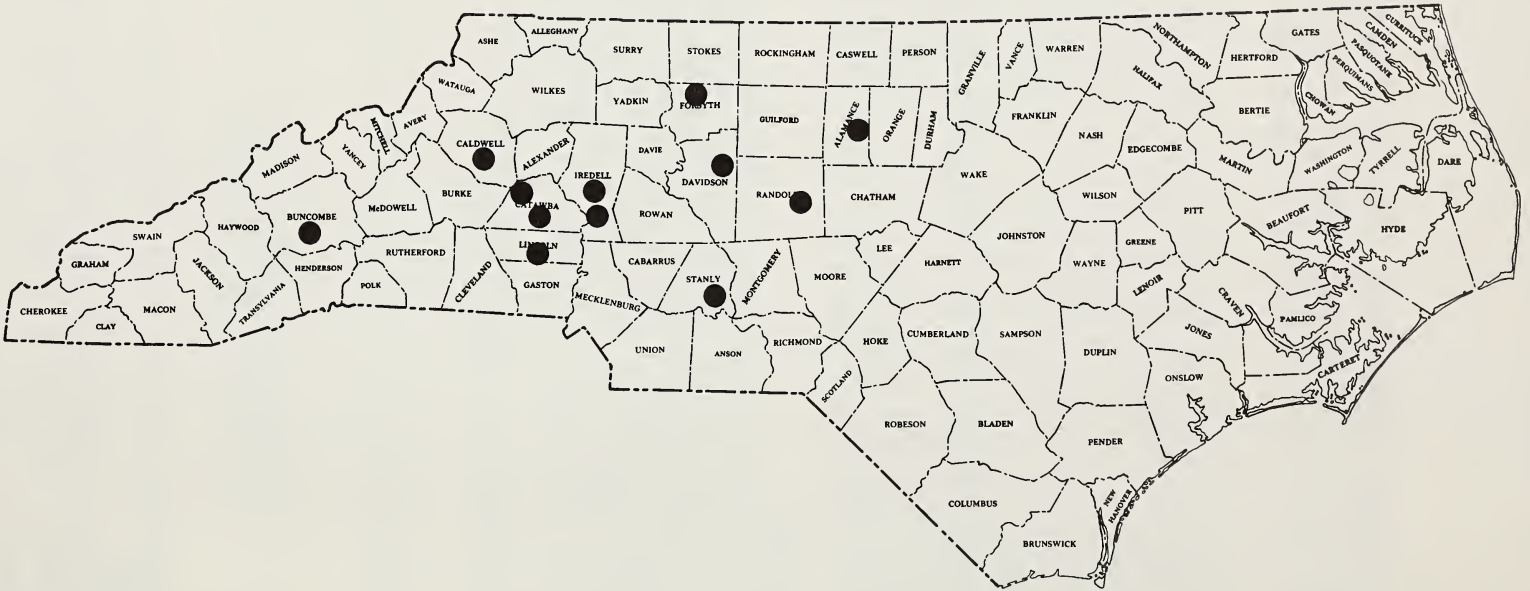

Figure 1.—Dots show location of furniture plants and yards in North Carolina where hardwood lumber was sampled.

In addition, species, board length to the nearest foot, average board width to the nearest inch, board-foot volume, and board grade were obtained. Lumber grades, board-foot volume, and miscut determinations were determined in conformance with National Hardwood Lumber Association Rules for Measurement and Inspection, 1963–1964.

Explanation of Terms

Mismanufactured lumber refers to boards that are miscut, scant, or oversize.

"Miscut," in 4/4 and 5/4 boards, refers to rough, green thickness variation greater than ¼ inch, except for wane, between the thinnest and thickest parts of a board within cuttings used in establishing a specific grade.

Lumber was classified "scant" if any one of the six measured points was thinner than 17/16 inches in 4/4, or 21/16 inches in 5/4, within required clear cutting areas making up the board grade.

"Oversize" lumber was of sufficient thickness to qualify for the next higher thickness class. For example, 4/4 nominal (which could measure no less than 17/16 inches) was classified oversize when the entire board was 21/16 inches or thicker. Boards were not classified oversize unless all of the six points measured were ¼ inch above nominal dimension.

Results

Study data reveal that 37.4 percent of the lumber sampled was mismanufactured. If the percentage by type of mismanufacture is applied to the total trucked board-foot volume (113,112,000)[4] of lumber received at North Carolina furniture plants, the following breakdown would result:

Type	*Percent*[1]	*Board-foot volume*
Miscuts	19.7	22,283,000
Scant	16.0	18,098,000
Oversize	1.7	1,923,000
Total mismanufactured	37.4	42,304,000

[1] These values are based on the assumption that all trucked lumber is circular sawn. A small percentage was probably bandsawn, which would change the mismanufactured values slightly.

Thickness measurements of 4/4 stock ranged from a minimum of 10/16 through 29/16 inches. The thinnest and thickest measurements of the sampled 5/4 lumber were 12/16 and 29/16 inches.

[4] Applefield, Milton. Sources of lumber for furniture plants in North Carolina 1963. Hardwood Research Council in cooperation with Southeastern Forest Experiment Station, Forest Service, USDA, May 1965.

Comparison with Previous Studies

Mismanufactured lumber continues to plague the hardwood-using industries. In 1955, about 10 percent of the lumber received by North Carolina furniture plants was thicker or thinner than prescribed or had excess variation within boards (fig. 2). In 1959 the volume of mismanufactured lumber had risen to about 30 percent. This increase occurred primarily from a tightening of National Hardwood Lumber Rules, which reduced the allowable variation for 1-inch lumber from $\frac{3}{8}$ to $\frac{1}{4}$ inch. The present study shows that, with the same $\frac{1}{4}$-inch thickness variation limitation, the volume of mismanufactured lumber has risen to 37 percent.

The Problem

Hardwood lumber continues to be mismanufactured at an increasing rate. The excellent market for hardwoods during the past few years is probably a factor in this situation because furniture lumber buyers are eagerly accepting almost all hardwood dimension lumber for sale. Until this situation changes, lumber buyers will probably accept mismanufactured lumber without much regard to dimension variations.

The significance of this problem is the waste produced by mismanufacturing. In most cases, oversize lumber is accepted as if it were nominal. This is costly, since seasoning and dressing problems are compounded by overly thick stock.

Potential Losses

Although the assessment of dollar losses resulting from mismanufactured lumber was not the objective of this study, an indication of potential losses from mismanufactured lumber has been computed.

For these purposes, assume that rough, air-dry, yellow-poplar is being used, and that the target nominal dimension is 1 inch. Assume also that all mismanufactured lumber consisting of miscuts and scants will be salvaged and used as $\frac{5}{8}$-inch lumber. Oversized lumber will not be considered, since it can be dressed down to 4/4 or used as is for thicker stock.

By applying the percent of scant and miscut lumber (35.7 percent) to the total volume of lumber trucked to North Carolina furniture plants (113,112,000 board feet), a volume of 40,381,000 board feet is obtained.

After this lumber volume has been planed down to $\frac{5}{8}$ inch, it is reduced to 25,238,000 board feet, a loss in volume of 15,143,000 board feet.

Dollar losses are equivalent to the difference in price between 4/4 at $139 and $\frac{5}{8}$ lumber at $113 per thousand board feet for rough, air-dried, No. 1 common yellow-poplar. In this case the loss amounts to more than 2$\frac{1}{2}$ million dollars. Such losses are prohibitive but, high as they are, they do not reflect other cost factors such as additional handling costs, additional processing costs (labor, power, machine wear), unsuitability of the mismanufactured lumber for use, and limited uses for $\frac{5}{8}$-inch-thick lumber.

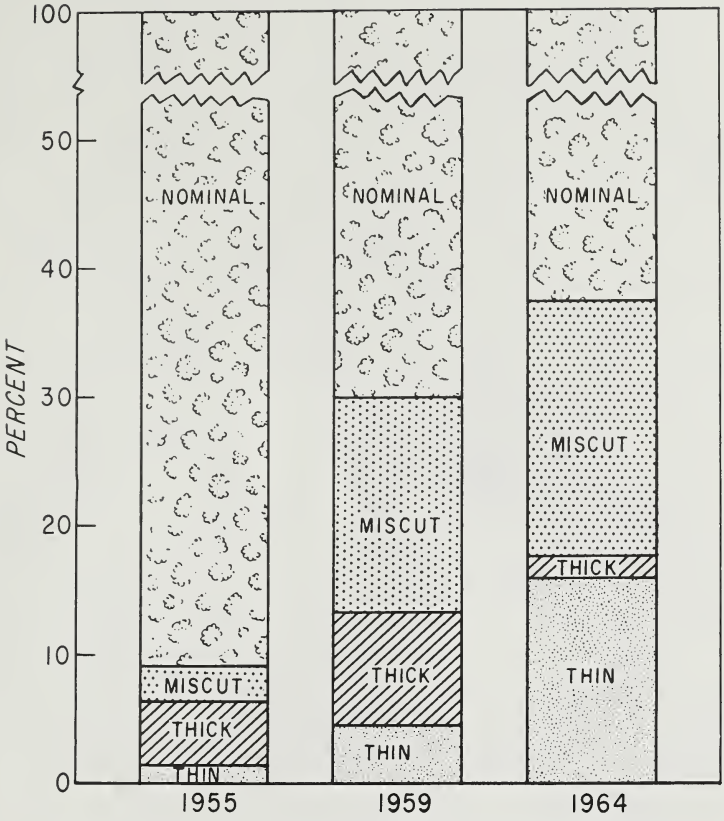

Figure 2.—Amount of mismanufactured lumber found at North Carolina furniture plants and lumber yards during three different sampling periods.

Solution Possibilities

Lumber mismanufacturing can be reduced at the source of manufacture, the sawmill.

A recent study[5] of 10 small circular sawmills in North Carolina revealed that 56 percent of mismanufactured lumber could be eliminated by making several simple adjustments to the sawmill. The principal and most frequent mill deficiencies were track misalignment and carriage shortcomings, including inaccurate setworks, misaligned headblocks and knees, and no pin in setworks, or failures to use the pin. Other contributing factors which can readily be corrected, are the saw plumb, saw lead, and saw guide.

The acceptance or rejection of poorly manufactured lumber rests with the lumber buyer. The problem exists at all plants and can be solved at many.

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[5] Rodenbach, R. C. Millwrighting—key to more accurately sawn lumber. Furniture, Plywood and Veneer Council of the North Carolina Forestry Association in cooperation with Southeastern Forest Experiment Station, Forest Service, USDA, Feb. 1963.

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